

CLAIMS

WE CLAIM

1. A device for generating a jet of air, comprising a housing having an aperture with an axis that defines an air flow direction, and a piezoelectrically actuated air-moving member disposed in said housing to move in a direction toward and away from said aperture in a manner that periodic jets of air are discharged through said aperture in said direction.

2. The device of claim 1 wherein said housing includes an end closure including one or more apertures.

3. The device of claim 1 wherein said piezoelectrically actuated air-moving member comprises first and second piezoelectric elements of opposite polarity joined together to form a bimorph member.

4. The device of claim 3 wherein said first and second piezoelectric elements are bonded together at an interface.

5. The device of claim 4 wherein each said piezoelectric element includes an electrode on an outer side connected to said source and a grounded electrode on an inner side at said interface.

6. The device of claim 3 wherein said bimorph member comprises a circular disc having a region bounded by a peripheral edge, said region being bendable.

7. The device of claim 1 wherein said piezoelectrically actuated air-moving member comprises a blade fixed at one end to said housing and free at an opposite end and a piezoelectric element on said blade.

8. The device of claim 1 wherein said piezoelectrically actuated air-moving member comprises a blade fixed at opposite ends to said housing and a piezoelectric element on said blade.

9. The device of claim 1 including a source of periodic signals for supply to a piezoelectric element of said air-moving member, said signals having a frequency selected to resonantly drive said air-moving member in said housing.

10. The device of claim 1 wherein said aperture has a dimension selected from at least one of a diameter and a width in the range of 1 to 5 millimeters.

11. A device for generating one or more jets of air, comprising a housing having a first aperture at an end and a second aperture at an opposite end, said first aperture and second aperture having substantially parallel axes defining air flow directions, a bimorph member comprising first and second piezoelectric elements of opposite polarity, said bimorph member being disposed in said housing substantially perpendicular to said axes for movement toward and away from said first aperture and second aperture, and a source of periodic signals to actuate said bimorph disc in a manner that periodic jets of air are discharged through said first aperture and second aperture.

12. The device of claim 11 wherein said bimorph member is supported in a groove in said housing.

13. The device of claim 11 wherein said bimorph member comprises a disc.

14. A method of generating a jet of air, comprising moving a piezoelectrically actuated air-moving member disposed in a housing to bend in a direction toward and away from an aperture in the housing to produce periodic jets of air discharged through said aperture in said direction.

15. The method of claim 14 including moving said air-moving member comprising first and second piezoelectric elements of opposite polarity joined together to form a bimorph member.

16. The method of claim 14 including moving said piezoelectrically actuated air-moving member comprising a blade fixed at one end to said housing and free at an opposite end and a piezoelectric element on said blade.

17. The method of claim 14 including moving said piezoelectrically actuated air-moving member comprising a blade fixed at opposite ends to said housing and a piezoelectric element on said blade.

18. The method of claim 14 including resonantly bending said air-moving member.

19. The method of claim 14 including discharging said periodic jets through said aperture having a dimension selected from at least one of a diameter and a width in the range of 1 to 5 millimeters.